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Pesticide Fact Sheet Number 106: Metolachlor

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16. Abstract (Limit: 200 words)

This document contains up-to-date chemical information, including a summary of the Agency's regulatory position and rationale, on a specific pesticide or group of pesticides. A Fact Sheet is issued after one of the following actions has occurred.

1. Issuance or reissuance of a registration standard,
2. Issuance of each special review document,
3. Registration of a significantly changed use pattern,
4. Registration of a new chemical, or
5. An immediate need for information to resolve controversial issues relating to a specific chemical or use pattern.

17. Document Analysis a. Descriptors

Pesticides, regulations, Chemical Information Fact Sheet, Use Patterns, Science Findings

b. Identifiers/Open-Ended Terms

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EPA

Pesticide Fact Sheet

Name of Chemical: Metolachlor
Reason for Issuance: Registration Standard
Date Issued: January, 1987
Fact Sheet Number: 106

1. Description of chemical

Generic name: 2-chloro-N-(2-ethyl-6-methylphenyl) N-(2-methoxy-1-methylethyl)acetamide
Common name: Metolachlor
Trade names: Dual, CGA-24705, Ontrack, Pennant
EPA Shaughnessy code: 108801
Chemical Abstracts Service (CAS) number: 51218-45-2
Year of initial registration: 1976
Pesticide type: Herbicide
Chemical family: Chloracetanilide
U.S. producer: Ciba-Geigy Corporation, Agricultural Division (from active ingredient manufactured outside the U.S.)

2. Use patterns and formulations

Application sites: For preemergence control of certain broadleaf and grassy weeds in terrestrial crop areas (corn, sorghum, cotton, potatoes, peanuts, soybeans, green beans, kidney and other beans, blackeye peas and other peas, stone fruits and tree nuts) and terrestrial noncrop areas (ornamental plants, railroad, and highway rights-of-way).
Types of formulations: 95% active ingredient (ai) technical grade manufacturing-use product. 5%, 15%, and 25% granulars, 86.4% emulsifiable concentrate, 27.5%, 31.8%, and 36.1% flowable concentrate with atrazine; 36.3% flowable concentrate with propazine; and 73.6% emulsifiable concentrate with metribuzin.
Types and methods of application: End-use product is applied by ground spray equipment, aircraft, or through center pivot irrigation systems.
Application rates: 1.25 to 4 lb metolachlor ai per acre (A) for terrestrial crop and noncrop areas.
Usual carrier: Water, fluid fertilizers.

3. Science findings

Summary science statement:

Metolachlor is not considered to be teratogenic or cause reproductive effects. It is not oncogenic in mice, but is considered an oncogen in rats, and is tentatively classified as showing limited evidence of carcinogenicity in animals. Metolachlor is not mutagenic

in available studies, but mutagenicity and metabolism testing requirements not in effect at the time of issuance of the orginal Metolachlor Registration Standard in 1980 must be met. Metolachlor has been found in several surface water surveys, some tapwater samples, and in ground water in two States. Monitoring studies are required to determine the extent of contamination on a national scale. Metolachlor is slightly to moderately toxic to nontarget organisms. Available data are insufficient to assess the environmental fate of metolachlor.

Chemical characteristics:

Physical state: Liquid
Color: White to tan
Molecular weight: 238.8
Boiling point: 100 °C at 0.001 mmHg
Solubility: 530 ppm in water at 20 °C, miscible with xylene toluene, dimethyl formamide, methyl cellusolve, butyl cellusolve, ethylene dichloride, and cyclohexanone. Insoluble in ethylene glycol and propylene glycol.
Vapor pressure: About 10^{-5} mmHg at 20 °C

Toxicological characteristics:

Acute effects:

Acute oral toxicity (rat): 2780 mg/kg (Toxicity Category III - moderately toxic)
Acute dermal toxicity (rabbit): > 10,000 mg/kg (Toxicity Category III - moderately toxic)
Acute inhalation toxicity: > 1.752 mg/L with 4-hour exposure (Toxicity Category IV - non toxic)
Primary eye irritation: Non-irritating
Primary dermal irritation: Non-irritating
Dermal sensitization: Sensitizer in guinea pig

Subchronic oral toxicity (dog): NOEL = 100 ppm (2.5 mg/kg) Decreased gain in body weight in males and females. Failure of the serum alkaline phosphatase to decrease with increased age, and possible effects on blood clotting systems at 300 and 1000 ppm.

Chronic effects:

3-generation reproduction (rat): NOEL = 300 ppm (15 mg/kg) Reduced pup weights and reduced parental food consumption at 1000 ppm (50 mg/kg)

Teratogenicity: Rabbits - Not fetotoxic or teratogenic Maternal toxicity at high dose (360 mg/kg/day)

Rats - Not fetotoxic or teratogenic. Decrease in food consumption at high dose (360 mg/kg/day) in first third of study.

Chronic feeding/oncogenicity: Mice - Not oncogenic in two studies up to and including 3000 ppm (429 mg/kg)

Rat - Systemic NOEL of 30 ppm (1.5 mg/kg). Systemic LEL of 300 ppm (testicular atrophy). In one study a statistically significant increase in primary liver neoplasms in females of high dose group (3000 ppm). In repeat study a statistically significant increased incidence of neoplastic liver nodules and proliferative hepatic lesions in females of the high dose group (3000 ppm)

Mutagenicity: Negative in an Ames Test, and a mouse dominant lethal test.

Major routes of exposure: Dermal, ocular, and inhalation from mixing concentrates and applying spray mixtures.

Physiological and biochemical behavior characteristics:

Absorption: Generally applied prior to plant emergence. Absorbed through shoots just above seed and possibly roots.

Mechanism of pesticidal action: Member of group of chloracetamide herbicides which are general growth inhibitors, especially of root elongation. Metolachlor may disrupt the integrity of plant cell membranes and inhibit lipid synthesis.

Environmental characteristics: Available data are insufficient to assess the environmental fate of metolachlor. There are indications that metolachlor is essentially stable

in loamy sand soil over 64 days. Absorption constants in sandy clay loam, loam, and two sand soils indicate mobility in these soils. Aged metolachlor ^{14}C residue was mobile in columns of loamy sand soil. Metolachlor ^{14}C residues were mobile in sandy loams, sand, and silt loam soil. Metolachlor ^{14}C residues were detected in plants grown in metolachlor-treated soil. Metolachlor has been found in several surfacewater surveys. Transient peaks of 1.2 to 4.4 ppb are reported in riverwater possibly as a result of runoff during spring and summer. Detectable levels of metolachlor were found in some tapwater samples. It has been found in ground water in two States.

Ecological characteristics:

Avian oral toxicity: Mallard duck > 2510 mg/kg
Avian dietary toxicity: Mallard duck > 10,000 ppm
Bobwhite quail > 10,000 ppm
Avian reproduction: Mallard duck - showed no impairment at any test level - 1,000 or 10,000 ppm
Bobwhite quail - NOEL = 10 ppm, impairment at 300 ppm but no effect at 1000 ppm
Freshwater fish toxicity: Bluegill sunfish - 10.0 ppm
Rainbow trout - 3.9 ppm
Aquatic invertebrates: Daphnia magna - 25.1 ppm
Fish life cycle: Fathead minnow - Maximum acceptable toxicant concentration > 0.78 < 1.6 ppm

Available data suggest that the hazard to nontarget organisms on an acute basis is slight to moderate.

Tolerance assessment:

Tolerances have been established for residues of metolachlor and its metabolites in raw agricultural commodities, milk, eggs, meat, fat, and meat byproducts [40 CFR 180.368(a)] as follows:

Commodities	Parts Per Million
Almond hulls	0.3
Cattle, fat	0.02
Cattle, kidney	0.2
Cattle, liver	0.05
Cattle, meat	0.02

Commodities	Parts Per Million
Cattle, meat byproducts (mbyp) (except kidney and liver)	0.02
Corn, fresh (inc. sweet, kernel plus cob with husk removed)	0.1
Corn, forage and fodder	8.0
Corn, grain	0.1
Cottonseed	0.1
Eggs	0.02
Goats, fat	0.02
Goats, kidney	0.2
Goats, liver	0.05
Goats, meat	0.02
Goats, mbyp (except kidney and liver)	0.02
Hogs, fat	0.02
Hogs, kidney	0.2
Hogs, liver	0.05
Hogs, meat	0.02
Hogs, mbyp (except kidney and liver)	0.02
Horses, fat	0.02
Horses, kidney	0.2
Horses, liver	0.05
Horses, meat	0.02
Horses, mbyp (except kidney and liver)	0.02
Legume vegetables group foliage (except soybean forage and soybean hay)	15.0
Milk	0.02
Peanuts	0.5
Peanut, forage and hay	30.0
Peanut, hulls	6.0
Peppers, chili	0.5
Potatoes	0.2
Poultry, fat	0.02
Poultry, liver	0.05
Poultry, meat	0.02
Poultry, mbyp (except liver)	0.02
Safflower seed	0.1
Seed and pod vegetables (except soybeans)	0.3
Sheep, fat	0.02
Sheep, kidney	0.2
Sheep, liver	0.05

Commodities	Parts Per Million
Sheep, meat	0.02
Sheep, mbyp (except kidney and liver)	0.02
Sorghum, forage and fodder	2.0
Sorghum, grain	0.3
Soybeans	0.2
Soybeans, forage and hay	8.0
Stone fruits group	0.1
Tree nuts group	0.1

Tolerances have been established [40 CFR 180.368(b)] for indirect or inadvertent residues of metolachlor as a result of application of metolachlor to the growing crops listed in 180.368(a) as follows:

Commodities	Parts Per Million
Barley, fodder	0.5
Barley, forage	0.5
Barley, grain	0.1
Buckwheat, fodder	0.5
Buckwheat, forage	0.5
Buckwheat, grain	0.1
Millet, fodder	0.5
Millet, forage	0.5
Millet, grain	0.1
Milo, fodder	0.5
Milo, forage	0.5
Milo, grain	0.1
Oats, fodder	0.5
Oats, forage	0.5
Oats, grain	0.1
Rice, fodder	0.5
Rice, forage	0.5
Rice, grain	0.1
Rye, fodder	0.5
Rye, forage	0.5
Rye, grain	0.1
Wheat, fodder	0.5
Wheat, forage	0.5
Wheat, grain	0.1

Canadian tolerances of 0.1 ppm have been established for residues of metolachlor in or on beans, corn, peas, potatoes, and soybeans. No Mexican tolerances or Codex Alimentarius Commission Maximum Residue Limits have been established for residues of metolachlor.

Results of tolerance assessment:

Using the NOEL of 30 ppm (1.5 mg/kg/day) from the rat chronic feeding study and a safety factor of 100, the acceptable daily intake (ADI) is 0.015 mg/kg/day, and the maximum permissible intake (MPI) is 0.9 mg/day for a 60 kg person. The established tolerances result in a total theoretical maximum residue concentration (TMRC) of 0.0755 mg/day (1.5 kg diet) which corresponds to 8.38 percent of the MPI for a 60 kg person.

4. Summary of regulatory positions and rationales

Unique label precautionary statements:

Manufacturing-Use Products

Environmental Hazards

Do not discharge effluent containing this product into lakes, streams, ponds, estuaries, oceans, or public water unless this product is specifically identified and addressed in an NPDES* permit. Do not discharge effluent systems without previously notifying the sewage treatment plant authority. For guidance, contact your State Water Board or Regional Office of the EPA.

End-Use Products

a. Environmental hazards for emulsifiable concentrates and flowable concentrates

Do not apply directly to water or wetlands (swamps, bogs, marshes, and potholes). Do not contaminate water by cleaning of equipment or disposal of wastes.

b. Environmental hazards for granules

Cover or incorporate granules that are spilled during loading or are visible on soil surface in turn areas. Do not contaminate water by cleaning of equipment or disposal of wastes.

c. Ground water and surface water advisory

Metolachlor has been identified in limited sampling of ground water and there is the possibility that it may leach through soils to ground water, especially where soils are coarse and ground water is near the suface. Following application and during rainfall events that cause runoff, metolachlor may

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* National Pollution Discharge Elmination System

reach surface water bodies including streams, rivers and reservoirs.

Care must be taken when using this product to prevent back siphoning into wells, spills or improper disposal of excess pesticide, spray mixtures or rinsates.

Check valves or antisiphoning devices must be used on all mixing and/or irrigation equipment.

d. Crop rotation statement

Crops other than beans (succulent and dry), fresh corn, grain corn, cotton, peanuts, peas (succulent and dry), chilli peppers, potatoes, safflower, sorghum, soybeans, stone fruits, tree nuts, and barley, buckwheat, millet, milo, oats, rice, rye, and wheat may not be planted in metolachlor-treated soil until 12 months after application

e. Endangered species statements for products registered for crop uses

It is a violation of Federal laws to use any pesticide in a manner that results in the death of an endangered species or adverse modification of their habitat.

The use of this product may pose a hazard to certain Federally designated endangered species known to occur in specific areas within the CALIFORNIA counties of Merced, Sacramento and Solano. Before using this product in these counties you must obtain the EPA Endangered Species Crop Bulletin. The bulletin is available from either your County Extension Agent, the Endangered Species Specialist in your State Wildlife Agency Headquarters, or the Regional Office of either the U.S. Fish and Wildlife Service (Portland, Oregon) or the U.S. Environmental Protection Agency (San Francisco, California). THIS BULLETIN MUST BE REVIEWED PRIOR TO PESTICIDE USE. THE USE OF THIS PRODUCT IS PROHIBITED IN THESE COUNTIES UNLESS SPECIFIED OTHERWISE IN THE BULLETIN.

5. Summary of data gaps (data required and due date)

Toxicology

Mutagenicity studies	October 1987
General metabolism	October 1988
Effects on coagulation	April 1987 **

** Date protocols are due. After acceptance, the Agency will provide timeframe for submission of the reports.

Environmental fate

Hydrolysis	July 1987
Photodegradation studies	July 1987
Metabolism studies	January 1989
Mobility studies	January 1989
Accumulation studies	January 1990
Ground and surface water monitoring	January 1987 **

Product chemistry/residue chemistry

Product chemistry	January 1988
Plant metabolism	April 1988
Storage stability	October 1988
Selected residue studies	April 1989

6. Contact person at EPA

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DISCLAIMER: The information presented in this Pesticide Fact Sheet is for information purposes only and may not be used to fulfill data requirements for pesticide registration and reregistration.

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